

Email

November 18, 2010

Mr Jamshed J Irani

Email: jjirani@tata.com

Dear Mr Irani,

I was delighted to hear from you and thank you for following up on our conversation on the diesel issue and sharing with me the emissions data from the Tata Motors. Diesel is a very serious public health issue and needs consensus and support on stringent action. I am happy to engage in this dialogue.

We have reviewed the emissions data of the car models that you have shared and also the three key observations that you have made with regard to the technology development of the diesel engines, reduction in emissions and the technology roadmap and low sulphur fuels.

I would like to share with you the following observations.

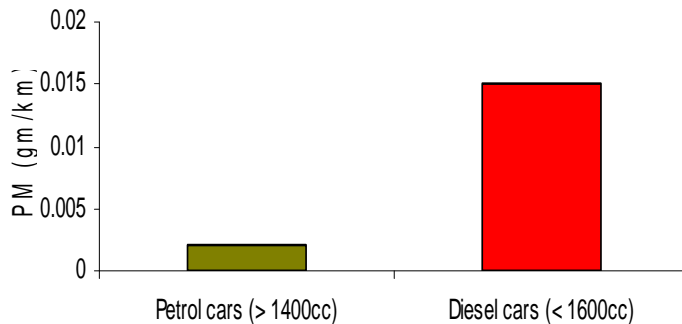
1. Specific observations related to the emissions data from Tata Motors

1.1 Vital data on particulate emissions from diesel car models is missing in the data shared with us: Tata Motor has not shared data on particulate emissions from diesel cars, which is the most serious public health concern in diesel vehicles. There cannot also be any data on particulate emissions from petrol and CNG/LPG cars. As the PM emissions from petrol and gaseous fuel cars are very negligible these are not even regulated under the current European regulations or any other set of regulations round the world. This is why normally particulate emissions from petrol, CNG and LPG cars are not even tested. Only in the future the PM emissions from petrol engines that have the gasoline direct injection system will qualify for PM emissions.

However, data on PM emissions from Euro III petrol cars are available because very recently the Automotive Research Association of India has carried out elaborate emissions testing of all vehicle models to develop emissions factors for the Indian models.

We have access to this test data on particulate emissions from vehicles and the results are worrying. ***The comparison of post 2005 models (Euro III – the current national norm) shows that diesel cars emit 7.5 times higher particulates than petrol cars (See graph 1).*** This means adding one diesel car to the fleet is equal to adding 7 petrol cars. Under in-use conditions the difference in emissions can be even higher.

Graph 1; Comparison of PM emissions from diesel and petrol cars



Source ARAI

1.2 The emissions data sent by you reveals serious pollutant problem of NOx, which is exceeding current norms and is a serious health hazard.

While the data sheet does not mention if it pertains to Euro IV car models, this is clearly what we would assume. If so, then you should inform the company representatives that their vehicles are in serious breach of current emission norms. As per the data you have sent, none of the Tata car models meet the Euro IV NOx norms of 0.25 gm/km or the HC+NOx norms of 0.3 gm/km.

But more importantly, you must note and bring to the attention of the company that the data shows that diesel car models still emit 20 times more NOx than petrol models and 6 to 9 times more NOx than the CNG and LPG model. This is extremely serious given the fact that both diesel related pollutants – PM and NOx are of very grave concern in our cities. While NOx is harmful in itself it is also responsible for catalyzing the formation of yet very harmful pollutant ozone. We also know that the control of NOx in diesel vehicles is an engineering challenge as the trade-offs are difficult to resolve.

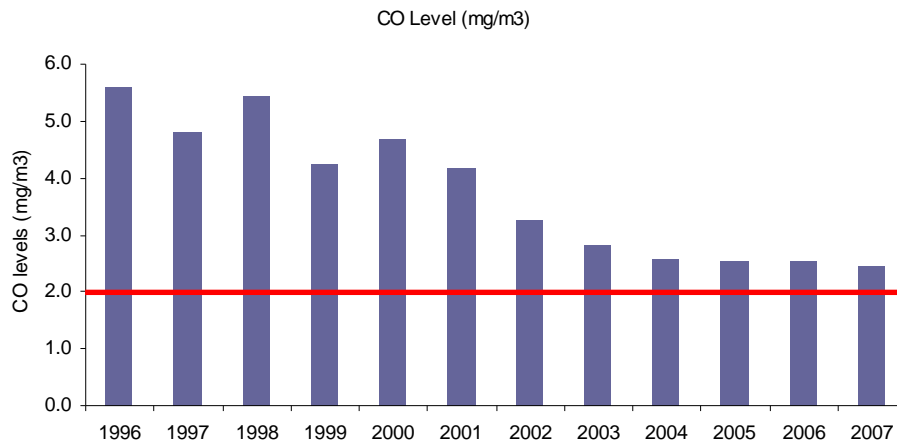
1.3 Carbon monoxide and hydrocarbon emissions from petrol cars need to be put into perspective and cannot be used to shield diesel vehicles

Often diesel vehicles are justified on the grounds that they emit less CO and HC than petrol cars. Firstly, data sent by you shows that the difference between petrol and diesel cars on CO and HC is not as wide as in the case of NOx. Also CO is the only pollutant in our air that has decoupled from motorization rates. This means despite the increase in petrol cars – that are responsible for nearly 90 per cent of CO emissions – the ambient CO levels have declined considerably. This is clear in Delhi where maximum numbers of cars are sold. (See graph 2).

Also hydrocarbons in diesel exhaust though lower are considered to be more toxic. According to California Air Resources Board Diesel exhaust includes contains 40 different toxic HC compounds that cause cancer, reproductive abnormalities and other toxic impacts. Total air toxics from a diesel car that are very harmful and carcinogenic are seven times higher than that from petrol cars. For the specific air toxics the diesel cars emit about 6 times more benzene and 2.3 times more 1,3 Butadiene than petrol

cars, they also emit about 9 times more total aldehydes and about 4 times more total PAHs than petrol cars.

Graph 2: Trend in carbon monoxide levels in Delhi's air



Source: CPCB

1.4 It is misleading to combine global carbon dioxide (CO₂) emissions with the local air pollutants

The table on emissions data adds up all local air pollutants and CO₂ together to show the difference between diesel and petrol cars. It is important to clarify that CO₂ is not considered a local air pollutant that can harm public health. CO₂ is a heat trapping gas and is responsible for global warming.

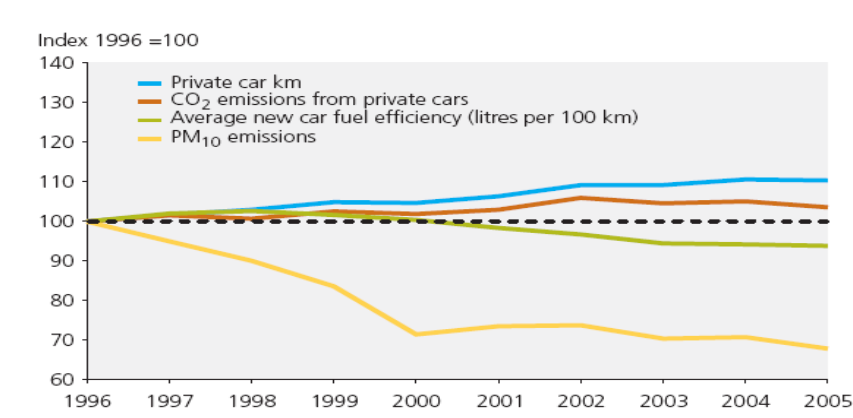
CO₂ is an indicator of the amount of fuel that the car is burning as it is directly linked with the carbon content of the fuel. More fuel we burn more CO₂ we get. From this perspective diesel cars are more fuel efficient and therefore emit comparatively less CO₂ per vehicle km traveled. The available data also bears this out.

However, the climate benefit of the diesel car is not that straight forward. While it is true that the car is more fuel efficient in terms of km/litre, carbon emissions per litre of diesel fuel burnt is higher as the carbon content of the fuel is comparatively higher than petrol. Therefore, if we burn more diesel fuel in larger cars and SUVs and also due to longer driving owing to cheap diesel fuels the total CO₂ emissions will actually be higher and negate the efficiency of the car in terms of km/litre.

A very important example of this trade off comes from London. The efficiency gains through technological improvement are lost because in most countries lower diesel prices encourage higher usage of diesel vehicles and that nullifies the gains. Studies have found that the UK is failing in maintaining the PM10 reduction trend due to rise in diesel vehicles. A study carried out by DEFRA in the UK shows that between 1996 and 2005 the amount of fuel used for each 100 km driven by new cars in the UK decreased by 6 per cent as a result of improvements in efficiency. Emissions of CO₂ from private cars rose by 4 per cent in the same period, mainly because of increasing distances traveled by car, which rose by 10 percent. PM10 emissions declined by 29 percent between 1996 and 2000, but subsequently have decreased by only a further 3 percent as the improvements have been offset by an increase in the use of, and emissions from, diesel cars.

The scientists have also implicated the black soot from diesel vehicles for global warming that can undermine the lower CO₂ emissions benefit of the diesel vehicles.

Graph 3: Negation of gains in London



Source: DEFRA, UK

1.5: It is also not appropriate to add up all local air pollutants on weight basis

It is now well established that all pollutants pose health effects but their degree of impact varies. Therefore, it is well established in pollution regulation that it is not appropriate to add up the weight of all the pollutants. For example, CO and NO_x have higher weights than PM but their toxicity and health effects vary. The toxicity of CO is considered lower on weight basis than those of other pollutants and the science of the health impact of PM increasingly points towards the importance of ultra-fine particles that are now considered most damaging to public health.

The data available from Europe for urban traffic shows that diesel and petrol cars meeting the same level of emission norms have different toxicity levels. The toxicity is several times higher for diesel emissions even as the emission standards are progressively tightened. The diesel cars toxicity becomes comparable when they are fuelled with Euro IV and fitted with particulate traps and equipped with a filter.

2. The CRDI technology for diesel vehicles is important but not a complete solution

Let us understand petrol and diesel car technology trajectory in India. With advent of Euro II standards we saw the death of carburetor technology in petrol cars as it was replaced with the superior fuel injection system. By year 2000 more than 80 per cent of cars changed over to the multi-port fuel injection (MPFI) system. A complete makeover followed soon. This helped to improve petrol engine performance and efficiency. Two-way catalytic converters were replaced with three way catalytic converter with closed-loop system. These changes improved fuel economy and emissions of petrol cars.

But in comparison, diesel car technology has been slow to improve in India. In Europe the demand for higher power output and better fuel economy led to early replacement of indirect injection (IDI) engines with DI engines in which fuel is injected directly into the combustion chamber which improves the power and efficiency.

But in India use of electronic controls began only when Euro III norms came into force during 2005 in few cities. Assessments show that till 2008 nearly half of diesel passenger vehicles in India were still powered by the IDI diesel engines, the common rail fuel injection system was employed in only 21 per cent of diesel passenger vehicles. With introduction of Euro IV norms in cities the CRDI technology is becoming more common in diesel passenger vehicles. This certainly opens up potential to improve diesel emissions and efficiency. But the emissions standards with lenient PM and NOx norms for diesel cars does not help to realize the full potential. The current norms also do not force the industry to use advanced after treatment systems to effectively cleanse the particulate emissions

3. We also disagree with the assessment that “*New diesel engine technologies have helped bridge the gap between diesel and gasoline/LPG/CNG emissions limits. In fact for Euro 5 and Euro 6, the emissions limits are even more stringent and this gap will further close.....*”

Bharat Stage IV standards are nowhere close the clean global benchmark. There are three dominant regulatory programs in the world -- the United States (including California), the European Union (EU), and Japanese emissions roadmaps. The EU and US standards and test procedures, or some mixture of them, have been adopted by many other countries. EU is lagging behind all these countries.

- **EU lagging behind the US and Japanese standards and we are far behind Europe.** The US has adopted fuel neutral and very stringent emissions standards that do not differentiate between petrol and diesel vehicles any more. All light duty vehicles irrespective of the fuels they use have to meet same and equally stringent emissions standards. This helps to create level playing field for all types of technologies and fuels to compete fairly on emissions ground. This is one of the reasons why diesel penetration in the US car market has been less than 1-2 per cent (also fuel price gap is narrow).
- The Euro IV norms are much more lenient than the current US norms. The current US Tier-2 NOx and PM limit values for light-duty vehicles are approximately

80 per cent tighter than the Euro IV car limits. The European PM and NOx norms for cars will close gaps with US standards only from Euro 6 onwards (2015). By any measure India is far behind.

4. Our response to your observation that “*Sulphur content in diesel has also reduced drastically, which coupled with the advances in diesel technology enables lower emission*”

The US, California and Japan, could leapfrog their emissions standards to phase in the clean diesel fuels and technologies because they also procured clean diesel fuel with sulphur content as low as 10 to 15 ppm. Without near zero sulphur fuels it is not possible to use the advanced emissions control systems as fuel sulphur destroys those systems and reduce efficiency.

The crux of the matter is that we still do not have clean diesel. The definition of clean fuels that was taken in board by the Supreme Court includes clean diesel. This has been defined as diesel fuel with 10 ppm sulphur diesel with caps on polycyclic aromatic hydrocarbons that is used in the vehicles fitted with advanced PM and NOx after treatment systems.

5. Our recommendation for your consideration

It is therefore important that in view of the public health concerns over diesel emissions we should continue to seek urgent policy action to remove price incentive for diesel cars. We are asking government to either equalize fuel taxes and prices or impose effectively high additional taxes on diesel cars to neutralize the current fuel price advantage that the cars enjoy.

Please do share this information with your colleagues and we will look forward to their response.

We hope you will also understand the reasons for our concern and will support us in our endeavors to push for cleaner air and changing mobility systems in the country.

With regards,

Sunita Narain